CLAIMS

1. An echo canceller, comprising:

a synthetic echo generator that generates a synthetic echo signal and a center clipper signal from a reference signal;

a difference function that generates an error signal from a desired signal formed from a near end signal that has been added to the reference signal; and

a center clipper modifier function, coupled to the synthetic echo generator and the difference function, that generates an improved center clipper signal from the center clipper signal, the reference signal, the error signal, and the echo cancelled signal.

2. The echo canceller according to claim 1, wherein the center clipper modifier function comprises:

a concentrated reference power function that generates a reference power value that is a measure of the power of the reference signal near the peak echo delay;

a desired signal power function that generates an average desired power value for each state time;

an error signal power function that generates an average error power value for each state time;

a reference signal noise floor estimate function that generates a reference signal noise floor;

a desired signal noise floor estimate function that generates a desired signal noise floor;

a delay function that generates a delayed improved center clipper signal from the improved center clipper signal; and

a decision process that generates the improved center clipper signal from the reference power value, the average desired power value, and the average error.

3. The echo canceller according to claim 1, wherein the center clipper modifier function is implemented using a digital signal processor and a set of stored program instructions.

4. The echo canceller according to claim 2, wherein the reference power value selects a maximum power of a predetermined number of average powers of segments of the reference signal near a peak echo delay time.

5. The echo canceller according to claim 2, wherein the decision process comprises a step of setting the improved center clipper signal to ON when any significant far end signal power occurs in the past near the peak echo delay time.

6. The echo canceller according to claim 2, wherein the decision process comprises a step of setting the improved center clipper signal to OFF when there is a significant desired signal power that is substantially greater than the far end signal power.

7. The echo canceller according to claim 2, wherein the decision process comprises a step of setting of the improved center clipper signal to OFF when the current power of the error signal is above a fairly high power, the powers of the desired and error signals have been above the fairly high power for a predetermined number of past state times, and the current power of the far end signal is less than a level that is a few dB lower than the fairly high power.

8. The echo canceller according to claim 7, wherein the fairly high power is –30dB.

9. The echo canceller according to claim 2, wherein the decision process comprises a step of setting the improved center clipper signal to OFF when the previous improved center clipper signal is OFF and the power of the desired signal has been above a fairly high power for a predetermined number of past state times and the power of the desired signal has been above the fairly high power for a majority of the predetermined number of past state times, and the current power of the desired signal is greater than a power that is a few dB lower than the fairly high power.

10. The echo canceller according to claim 7, wherein the fairly high power is –30dB.

11. A transit network that comprises the echo canceller according to claim 1.

12. A termination device that comprises the echo canceller according to claim 1.

13. The echo canceller according to claim 1, wherein the clipper signal is essentially determined from values generated only by an adaptive filter having the reference signal as an input.

14. A method for echo cancellation, comprising the steps of:

generating a synthetic echo signal and a center clipper signal from a reference signal;

generating an error signal from a desired signal that has been added to a negative of a synthetically generated echo signal; and

generating an improved center clipper signal from the center clipper signal, the reference signal, the error signal, and the echo cancelled signal.

15. The method of echo cancellation according to claim 14, further comprising the step of generating the desired signal by adding a near end signal to the reference signal as modified by a system echo.

16. The method of echo cancellation according to claim 14, wherein the step of generating the improved center clipper signal comprises the steps of:

generating a reference power value that is a measure of the power of the reference signal near the peak echo delay;

generating an average desired power value for each state time;

generating an average error power value for each state time;

and

generating the improved center clipper signal each state time from the reference power value, the average desired power value, and the average error power value .

17. The method of echo cancellation according to claim 16, wherein the step of generating an improved center clipper signal each state time further comprises the steps of:

generating a reference signal noise floor; and

generating a desired signal noise floor;

and wherein the step of generating the improved center clipper signal includes generating the improved center clipper signal from the reference signal noise floor and the desired signal noise floor.

18. The method of echo cancellation according to claim 15, wherein the step of generating an improved center clipper signal further comprises the steps of:

generating a delayed improved center clipper signal from the improved center clipper signal, and wherein the step of generating the improved center clipper signal includes generating the improved center clipper signal from the delayed improved center clipper signal.